STATE OF NEW HAMPSHIRE
OFFICE OF THE GOVERNOR

CHRISTOPHER T. SUNUNU
Governor

September 10, 2021

The Honorable Joseph R. Biden Jr.
President of the United States
The White House
Washington, D.C. 20500

Through: Paul Ford
Acting Regional Administrator
FEMA Region 1, Boston, MA 02110

RE: Request for Presidential Major Disaster Declaration

Dear Mr. President:

Under the provisions of Section 401 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §§ 5121-5207 (Stafford Act), and implemented by 44 CFR § 206.36, I respectfully request that a major disaster be declared for the State of New Hampshire (NH). This request is a result of severe storms and flooding which occurred on July 17-19, 2021 that overwhelmed state and local resources and required an immediate and urgent response. At the peak of the incident, flash flooding and riverine flooding occurred that prompted numerous local Emergency Operations Centers to open, washed out road infrastructure in 14 communities, threatened the integrity of multiple low head dams, flooded homes with up to four feet of water and created sink holes around residential properties, and required the State Emergency Operations Center (SEOC) to open and provide coordination for information sharing and resource support, including the delivery of supplies for sheltering operations. This request includes a designation of the full Public Assistance Program for Cheshire County and a statewide designation of the Hazard Mitigation Grant Program.

As a direct result of the incident, NH sustained major damages to state and local infrastructure which lead to numerous requests for state assistance. Reported damages were concentrated in Cheshire County where the heaviest rain fell; however, other areas of the state saw intense rain and flooding that threatened public safety and damaged infrastructure. The impact of this event was felt throughout the local mutual aid and state systems as personnel and assets were diverted to the incident area. The response consumed staff time and exhausted available resources due to significant flash flooding conditions that caused extensive roadway destruction and left debris that restricted travel and emergency operations. Fortunately, there were no deaths or serious injuries associated with this incident.

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This rainfall and flooding event was preceded by two weeks of above average rainfall in southwestern New Hampshire, where five to eight (5-8) inches of rain had already fallen within the previous 30 day period. This area of the state typically sees around four to five (4-5) inches of rainfall throughout the entire month of July, meaning the area was on track to be well above the average for monthly precipitation. Soil moisture and river levels were above average at the start of the rainfall event that caused the flooding on July 17-19, 2021. These antecedent conditions, in addition to the rainfall received on July 17-18, 2021, would later set the stage for much of the State of New Hampshire to experience the wettest month on record according to the National Weather Service in Gray, ME (full meteorological report below). This came on the heels of widespread drought conditions in New Hampshire, replacing one economic and climatological stressor with another.

Two rounds of widespread, heavy precipitation moved through southwestern New Hampshire on the evening of July 17, 2021. A combination of very warm, moist air and slow moving clusters of thunderstorms deposited rainfall in excess of two to four (2-4) inches across the disaster area, with the highest official rainfall report being 6.90 inches in the Town of Jaffrey. The majority of the precipitation fell within a period of less than 12 hours, with estimated rainfall rates as high as three (3) inches per hour reported at times. According to NOAA Atlas data, the recurrence interval of a rainfall event of this magnitude is once every 25 to 50 years, with isolated areas with the highest rainfall amounts, such as Jaffrey, experiencing a 1% probability event (a recurrence interval of 100 years). Extensive flooding was reported in several towns across southwestern New Hampshire through the early morning hours of July 18th, and flood waters did not fully recede along river and streams in the impacted area until July 19th.

This extreme rainfall was rapidly converted to runoff when the saturated ground could no longer support infiltration and instead channeled the rainfall into water ways, causing a sudden flash flooding event that resulted in severe damage to local and state roadways, culverts, and bridges. State departments responded to assess road and infrastructure status, block off dangerous areas, and close roads that were impassable. The rapid rise of flood waters occurred after dark and took many residents and visitors in the area by surprise, prompting first responders to assist residents in Jaffrey to navigate high water to get to higher ground. The towns of Rindge, Alstead, Winchester, New Boston, Jaffrey and Keene opened their local Emergency Operations Centers (EOC) to coordinate their response efforts, assess damages, set up barricades, monitor traffic control points, and respond to emergency calls.

Based on Initial Damage Assessments (IDA) reported by the communities, the Director of Homeland Security and Emergency Management (HSEM), Jennifer L. Harper, requested a Joint Preliminary Damage Assessment (PDA) on July 27, 2021. The assessment was conducted from August 4, 2021 through August 13, 2021 by teams comprised of representatives from local, state, and federal agencies. The validation and documentation collection effort continued through September 9, 2021.

Joint PDAs were completed in 14 communities in Cheshire County and four (4) communities in Hillsborough County. Additionally, two (2) State agencies—Department of Transportation and Department of Natural and Cultural Resources—completed PDAs. The effects of this incident are evident as demonstrated in the Public Assistance summary (Enclosure B).

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The State indicator has exceeded $2,040,529 ($1.55 per capita), with current state and local damages verified at $2,064,752 ($1.57 per capita) from this event. An additional $229,783 in damages was validated by FEMA for Hillsborough County, bringing the total verified amount to $2,294,535 ($1.74 per capita). Although Hillsborough County did not meet its monetary threshold to request a Major Disaster Declaration, the financial and economic impact felt by the community remains. The figures captured in Enclosure B reflect uninsured losses for Cheshire County and only those that meet FEMA project eligibility at initial review; the overall losses were significantly higher and are expected to rise. As described in Enclosure B below, over 96% ($1,984,143) of the Public Assistance cost estimate involved roads and bridges (Category C). Other permanent work, including Category E (Buildings and Equipment) and Category F (Public Utilities), has a current assessment of $47,211, which is 2.29% of the Public Assistance cost estimate. Emergency work, Category B (Emergency Protective Measures), are estimated at $33,399 in damages, which is 1.62% of the total Public Assistance cost estimate. These percentages highlight the impact to public infrastructure in this event. We anticipate these costs to increase as communities and state partners are able to gather additional costs and damage information for both emergency and permanent work. It is important to note that Cheshire County alone met the entire state indicator threshold to request a Major Disaster declaration for New Hampshire, a fact that highlights the profound impact that this event has had on the communities that received damages during this flood. The damages noted above do not have any available insurance proceeds and will be the complete financial responsibility of the municipalities without Federal assistance.

Across the state, the communities that sustained the most eligible damage with regard to the PDA assessment include Jaffrey, Keene, Richmond, and Fitzwilliam Additionally, the Department of Transportation and the Department of Natural and Cultural Resources experienced damages from this event.

The City of Keene was among the hardest hit communities in Cheshire County during this event. Over five inches of rain fell which flooded private businesses and homes. 80 residential basements in the community flooded and required assistance from the city to pump the water out of their homes. Flooding caused reservoir levels at Robin Hood Park to rise and almost breach a City owned dam. Although the dam was not breached, blockages formed in the reservoir due to vegetative and other storm debris and the city experienced damage to nearby park infrastructure as a result. Keene saw a 380% increase in 911 calls at the peak of the storm, and the City opened its EOC at a Partial Activation Level to coordinate emergency services and public works crews to respond to the needs of residents and close nine roads to traffic due to flooding and major washouts in order to protect the safety of the community. A 24 foot long by 15 foot wide by 14 foot deep sinkhole formed on a street that leads to the central square in the City, requiring significant temporary work to stabilize the site. Additionally, City infrastructure was substantially impacted as a sewer grate and storm basin was undermined by flood waters, resulting in a sinkhole 5.5 feet long by 9 feet wide as the structure caved in on itself. Culverts throughout the city were undersized for an event of this magnitude, resulting in failures and washouts and erosion damage to roads. The damages and response efforts resulted in $359,736 of damages that were validated by FEMA during the Joint PDA process, an amount that accounts for approximately 8% of their $4.6M annual public works budget. The actual cost of repairs will be significantly higher than the FEMA validated PDA costs, which only factor in pre-disaster condition work. Current construction

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requirements and upgrades to align with current codes will increase that number significantly. The City is facing financial hardship at this time due to the amount and cost of construction material and rented equipment that are required to make temporary repairs. Permanent repairs will put a significant strain on the City and its ability to maintain their operating budget for the year.

The Town of Jaffrey also experienced significant impacts to its town infrastructure during this flood event after they received almost seven (7) inches of rain within a 12 hour period. More than 15 roads had washout damage, including one that lost a major culvert which led to flooding and the evacuation of 39 homes. Emergency access has since been restored to the neighborhood at one location via temporary work, but the permanent repairs in this location will be extensive and are anticipated to cost the town over $1 million dollars in order to meet current construction codes.

In the Town of Winchester, flood waters inundated a solar field that was under construction causing damage to work that was already completed. This critical infrastructure project is now 30 days behind due to the damage. The waste water treatment plant experienced damage to wells, meters, and pumps due to significant overflow, and the basement of the historic town library was flooded with seven (7) inches of water during the event, resulting in a loss of antique books among other assets. A local dam in the area was overtopped by flood waters and sand bagging efforts took place to prevent further damage. The town also opened a shelter for affected residents during the event.

In Cheshire County, the Town of Richmond (2010 pop 1,155) suffered $243,693 in FEMA verified damages. The resulting per capita damage for the community is $210.99. The Town of Jaffrey (2010 pop. 5,457) experienced $617,682 in FEMA verified damages from the storm, resulting in a $113.19 per capita damage for the community. The Town of Roxbury (2010 pop 229) suffered $25,709 in FEMA verified damages, resulting in a damage per capita for the community of $112.26.

The annual public works budgets for these small communities have been far exceeded by this event. The Town of Jaffrey has a proposed 2021 public works budget of approximately $1M, the primary income for which is local taxes. With over $617,000 in verified damages for this event alone, a number that is expected to rise, the Town is unable to absorb the cost of the immense damages while keeping their scheduled infrastructure repairs and improvements on track. The Town of Richmond reports a 2020 operating budget of $777,319, with approximately $194,035 dedicated to highways and streets. The estimated cost of this disaster represents over 30% of their entire annual operating budget, and is over 1.25 times greater than their annual road budget. The financial hardships that these communities will endure due to this flooding will likely force them to cut back on planned road repairs, delay scheduled road work, increase taxes, and take out loans in an attempt to recover. Towns impacted by this event have had to move capital reserve funds out of their budgets to fund flood repairs and will likely have to postpone capital improvement and scheduled public works projects in order to fund the recovery effort needed following this disaster.

Throughout these communities, roads were undermined and roadside shoulders, ditches, and adjacent slopes were washed away. State and local culverts, pipe headwalls, and other drainage structures were overwhelmed with water and debris causing damage or complete destruction to the drainage system and surrounding areas and infrastructure. Water that would have normally been

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conveyed by the drainage system was forced to detour to other areas not designed to handle such flows. Road washouts were impressive, with some areas seeing washout depths of over seven (7) feet deep. These damages presented a hazard to the travel of the general public, as well as obstacles for first responders in preserving public health and safety. Some of the washouts carried dirt and cobble onto private property, and large amounts of debris were deposited on roads thus making them impassable. Guardrails were left suspended in air as their foundations washed away, and roads were undermined making them unsafe for travel. The extensive damage to state, local, and private roads in these communities trapped residents in their homes and prevented access by emergency personnel. More than 50 homes in the county were cut off from emergency services for up to two (2) days in some cases while the communities made emergency repairs to roads. One university in the county lost emergency access to the campus, requiring the temporary evacuation of 70 individuals.

Individual Assistance requests from residents have been managed by the state, and four (4) cases have been reported to date. Additional cases are possible. None of the existing cases have been moved to long term recovery as of this date. Traditional resources that the State would engage to help these residents have been unable to assist due to the fact that the Community Action Programs (CAP) and welfare offices do not handle cases involving loss of access to an individual's home caused by local and private road washouts during the storm. At the time of this writing, one resident must replace an access bridge on his property. This resident, like many others, did not have flood insurance on the structure and therefore must pay for this cost out of pocket. Additionally, residents that did have flood insurance were deemed ineligible by the insurance companies because the policies in play do not cover the type of flood damages the residents received. This has created a significant financial hardship for these residents. The State is helping residents apply to additional assistance programs they may qualify for given their income status. Referrals were made for two residents to the American Red Cross and Southwestern Community Services, but these residents have not received assistance to date.

The Department of Transportation (DOT) experienced damage to five (5) state owned roads and three (3) rail trails in eight (8) communities. Rail trails experienced significant washouts that exceeded 12 feet deep in some locations. DOT is experiencing a significant labor shortage due to the COVID-19 Pandemic, putting further strain on current DOT labor assets and creating competition between ongoing projects and work to be completed as a result of this disaster. Additionally, as most work currently being completed by the DOT is in preparation for the winter season, this disaster has delayed or postponed projects that help keep state roads and the traveling public safe during cold season inclement weather.

The Department of Safety, including State Police and Emergency Communications (i.e. State Public Safety Answering Points), responded to emergency calls for assistance from residents, visitors, and towns. Call logs illustrate a number of requests for assistance due to downed trees and power lines, utility poles undermined by flood waters, motorists who became stranded when trying to cross flooded roadways, power outages, accidents and vehicles off the roadway due to road washouts, and welfare checks on residents with flooded properties. State agencies also responded to call out requests from towns for state assistance.

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The Department of Natural and Cultural Resources (DNCR) also experienced significant erosion and washouts on state property, resulting in the temporary closure of at least one emergency access road in the Monadnock State Park area. Loss of any emergency access road in this area is problematic given the extremely high tourism rate that this location receives. It is often claimed that Mount Monadnock in New Hampshire is one of the most hiked mountains in the world, second only to Mount Fuji in Japan. The popularity of this site results in a high frequency of search and rescue operations that are required for inexperienced or ill-prepared hikers. Therefore, loss of any emergency access hinders the effectiveness of first responders. Initial assessments also showed that a bridge owned by DNCR was destroyed and washed downstream. It is unknown at this time if the entirety of the structure will have to be replaced. Additionally, DNCR reported that damage occurred at Pisca State Park, but the details of that damage are currently unknown. Agencies are still working to gather a full assessment of damages to state-owned property and infrastructure.

Pursuant to the severity of this storm, on July 18th, I executed the State Emergency Operations Plan (SEOP) with the activation of the SEOC to a Partial Level. While I did not declare a State of Emergency in NH, the nature and amount of state and local governmental resources that have been or will be used to alleviate the conditions of this disaster are as follows:

1. The SEOP was activated on July 18, 2021 and I instructed the HSEM Director to staff the SEOC. The SEOC was activated to monitor the situation, coordinate state response activities, and to respond to local requests for assistance and resources. The SEOC was activated at 1000 hours on July 18, 2021 following reports of flooding from local communities and was staffed until 2030 hours on July 18, 2021 when all communities had been contacted to confirm the need for state assistance and coordinate resources that would be deployed to communities. Prior to the SEOC opening, the HSEM Duty Officer had been in communication much of the previous evening with communities that were experiencing flooding. After the closure of the SEOC, the HSEM Duty Officer remained on call on a 24/7 basis to coordinate any additional needs that the local communities may need from the State.
2. ESFs that were activated at the time of the SEOC activation included Transportation (ESF 1), Public Works and Engineering (ESF 3), Emergency Management (ESF 5), Mass Care, Emergency Assistance, Temporary Housing and Human Services (ESF 6), Heath and Medical (ESF 8), and Public Information (ESF 15). The National Weather Service also had a representative at the New Hampshire SEOC that assisted with providing forecast data and gathering flood model information from the Northeast River Forecast Center during the time of active riverine flooding.
3. The DOT coordinated transportation, public works, and engineering needs across the state. Numerous roads across the state required debris removal and repairs to infrastructure.
4. The Department of Environmental Services (DES) monitored and coordinated response to storm impacts to rivers, dams, and public drinking water supplies across the State. They also provided stream monitoring and dam inspections following flash flooding and washouts.
5. The American Red Cross provided support and resources for sheltering needs.

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6. Eight (8) communities activated their local EOCs to respond to the needs and safety of their communities during this disaster. Coordinating activities included clearing debris, reestablishing road access, water level monitoring, health and welfare checks of residents, and coordination of response and recovery efforts.

The State is actively managing recovery efforts for six (6) disasters (DR 4329, DR 4355, DR 4370, DR 4371, DR 4457, and DR 4516), five (5) of which were declared within a 22 month period between August 2017 and July 2019. If granted, this would be the second federally declared disaster the State has experienced in the last 18 months. The following list of incidents capture events over the last four (4) years in which state and local jurisdictions expended a considerable amount of their own funds for response and recovery efforts. These events resulted in Federally Declared Disasters that all have ongoing recovery operations at this time:

- January 20, 2020 and ongoing: FEMA-4516-DR
  - The COVID-19 Pandemic has put an incredible amount of strain on State and local resources and response capabilities. The length and sheer magnitude of this disaster has far exceeded any that the State has experienced in the past. To date, 107,689 people have tested positive in New Hampshire for COVID-19 and 1,417 people have died as a result of the virus. The State continues to coordinate with Federal and local partners to vaccinate as many Granite Staters as possible to protect them against the virus. Booster shots for the vaccine will soon be available and the State will once again coordinate the vaccination effort and ensure that the health care system can handle the influx of patients. Additionally, as the Delta variant continues to rapidly spread across the country, the State is preparing contingency plans for enhanced response actions that may be necessary.
  - NH is still actively responding to this disaster.

- July 11-12, 2019: FEMA-4457-DR
  - A flash flooding event caused significant damages to the towns in Grafton County. The recurrence interval of a rainfall event of the magnitude that occurred during this incident is once every 1,000 years, or 0.1% chance annually according to NOAA Atlas-14 data.
  - The flooding caused damages in towns that exceeded seven to ten (7-10) times their annual operating budgets. Campgrounds were flooded, prompting emergency swift water rescues, emergency road closures, and a debris plugged a 16 foot wide culvert, resulting a dam-like structure that burst in the middle of the night, sending a 15 foot wall of water downstream in several communities. The water washed away roads, culverts, berms, and a local race track that is a major economic staple in the area. State infrastructure, including snowmobile, hiking, and other recreational trails that are essential to the New Hampshire economy, were damaged and closed to the public for many weeks.
  - NH is still actively managing recovery efforts for this disaster. Towns in Grafton County were hit particularly hard in this event and were still recovering from DR 4355 and DR 4329 when this flash flooding event occurred. Many of the same areas that suffered flooding and damages to their infrastructure in DR 4355 saw new and more significant damage following this flash flooding event. The economic strain

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that resulted from these back to back disasters has left some towns ill-equipped to manage another disaster.

- March 13-14, 2018: FEMA-4371-DR
  - A severe winter storm resulted in significant snowfall in all 10 counties and required a comprehensive statewide snow removal response by local and state agencies. Blizzard conditions caused hundreds of traffic accidents and vehicles off the road, forced over 500 school closures, and delayed or canceled transit, rail and flights across much of the state.
  - NH is still actively managing administrative functions for this disaster declaration.

- March 2-8, 2018: FEMA-4370-DR
  - Strong winds, significant storm surge up to three (3) feet, and coastal flooding caused widespread damages to infrastructure and the seawall in Rockingham County. At the peak of the incident, wave heights reached upwards of 18 feet.
  - NH is still actively managing recovery efforts for this disaster. Seawall repairs and mitigation will take multiple years to complete due to project complexity.

- October 29 – November 1, 2017: FEMA-4355-DR
  - A low pressure system combined with the remnants of Tropical Storm Philippe to produce a historic coastal storm that caused unprecedented winds and flooding across the entire state and resulted in power outages to over 270,000 customers and significant infrastructure damage.
  - NH is still actively managing recovery efforts for this disaster. Towns in Grafton County were hit particularly hard in this event and were still recovering from DR 4355 when this most recent flash flooding event occurred. Many of the same areas that suffered flooding and damages to their infrastructure in DR 4355 saw new and more significant damage following this flash flooding event.

- July 1-2, 2017: FEMA-4329-DR
  - Severe thunderstorms with heavy rain left widespread damages to state and local infrastructure. The storm resulted in flooded campgrounds that were evacuated to a local shelter, and caused significant damages in Coos and Grafton Counties.
  - NH is still actively managing recovery efforts for this disaster. Towns in Grafton County were still recovering from DR 4329 when this most recent flash flooding event occurred. They have not had a chance to completely recover from the severe storm in July when they suffered additional flooding and damages to their infrastructure.

Given the severity and magnitude of this natural disaster, Federal assistance is necessary to supplement the efforts and available resources of the state and local governments to recover from disaster related losses. Additionally, as required by 44 CFR § 206.36 (c)(5), I certify that all state and local government obligations and expenditures for the current disaster will comply with all applicable cost sharing requirements of the Stafford Act.

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Thank you for your consideration of this Major Disaster Declaration Request. I look forward to your response. Please do not hesitate to contact me or my staff with any questions.

Sincerely,

Christopher T. Sununu
Governor, State of New Hampshire

Enclosures: *OMB No. 1660-0009/FEMA Form 010-0-13*
Weather and Hydrological Summary, NWS Gray, ME
B: Supplemental Information for Public Assistance

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New Hampshire Weather and Hydrological Summary
Donald Dumont – Warning Coordination Meteorologist
National Weather Service Gray, ME

Flash Flooding: July 17-19, 2021

Summary
Showers and thunderstorms with heavy rain moved into Southwest New Hampshire on the evening of July 17 into the early morning hours of July 18. These storms were part of a cluster of thunderstorms that developed along a stationary front located from Upstate New York and across Massachusetts. The torrential rainfall from these repeating storms produced localized flash flooding over portions of Cheshire and Hillsborough Counties during the night. Minor river flooding occurred on July 18th through the 19th.

Antecedent Conditions
Rainfall had been above normal across Cheshire and Hillsborough counties leading into the flood event with 30-day rainfall totals for the region generally in the 5 to 8" range. Soil moisture was above normal in this area compared to the remainder of the state where conditions were drier than normal. In addition, river levels were running near to above average in this area before the flood event.

Weather Overview
The first round of storms moved north from Massachusetts between 7 and 8 PM, with rainfall rates estimated at 3 inches per hour. Much of southeastern Cheshire and southwestern Hillsborough Counties observed 1 to 2 inches of rainfall within 30 to 40 minutes due to excessive rainfall rates. The heaviest rain fell over the Beaver Brook in Keene and near Dublin Pond in Dublin where flash flooding was first reported as early as 9 PM. Rain continued through the evening but with less intensity, until another round of heavy rain moved back in around 1030 PM. This second cluster of heavy rain triggered another round of flash flooding that lasted into early Sunday morning. Periods of rain continued in the same area through the night with the rain moving out around daybreak on the 18th.

The combination of these rounds of rain produced more than 5 inches of rain to portions of Cheshire and Hillsborough Counties with a few localized areas over 6". This amount of rainfall in a 12 hour period makes this rainfall event a 25 to 50 year event for portions of the counties, with localized areas around Jaffrey recording a 100 year or 1% probability event. Extensive flooding was reported in several towns across the two counties through the early morning hours of Sunday, July 18th.

Rainfall Reports

...Cheshire County...

Jaffrey	6.90 in	0700 AM 07/18	COOP
1 SW Jaffrey	5.62 in	1050 AM 07/18	AWS
West Swanzey 2.0 ENE	5.10 in	0800 AM 07/18	COCORAHS
1 N Swanzey	5.05 in	0754 AM 07/18	Trained Spotter
Marlborough	5.02 in	0930 AM 07/18	Public
Marlborough	4.95 in	1046 AM 07/18	CWOP
Keene 1.9 SE	4.87 in	0700 AM 07/18	COCORAHS
Keene 2.0 SE	4.53 in	0600 AM 07/18	COCORAHS
Keene 1.3 SW	4.25 in	0700 AM 07/18	COCORAHS
1.6 W Keene	4.06 in	0600 AM 07/18	COOP
Keene 2.5 NNW	3.08 in	1000 AM 07/18	COCORAHS
1 ENE Spofford	3.00 in	0800 AM 07/18	Trained Spotter
Rindge 3.2 ESE	2.45 in	0700 AM 07/18	COCORAHS
West Chesterfield 0.3 WNW	2.45 in	0700 AM 07/18	COCORAHS
West Swanzey 1.0 WNW	2.27 in	1200 AM 07/18	COCORAHS
Keene 6.8 W	1.82 in	0600 AM 07/18	COCORAHS
Walpole 2S, NH	1.56 in	1040 AM 07/18	HADS
2 SE Keene	0.97 in	0800 PM 07/17	Trained Spotter

...Hillsborough County...

Nefire Portable 2	4.01 in	1030 AM 07/18	RAWS
New Boston	2.52 in	1046 AM 07/18	CWOP
2 NNW Weare	2.40 in	1016 AM 07/18	Public
Temple	2.24 in	1046 AM 07/18	CWOP
Mont Vernon 1.3 SSW	2.16 in	0800 AM 07/18	COCORAHS
2 WNW Bedford	2.16 in	1050 AM 07/18	AWS
Greenville 1.1 ENE	2.00 in	0800 AM 07/18	COCORAHS
Amherst 3.7 NNE	1.99 in	0700 AM 07/18	COCORAHS
New Boston	1.87 in	1047 AM 07/18	CWOP
Hollis	1.74 in	1046 AM 07/18	CWOP
Manchester	1.66 in	1050 AM 07/18	CWOP
Manchester 0.6 S	1.61 in	0700 AM 07/18	COCORAHS
Hollis	1.61 in	1030 AM 07/18	CWOP

Table 1: Rainfall Observations from NWS Gray Public Information Statement Issued on 1112 AM Sunday, July 18th 2021

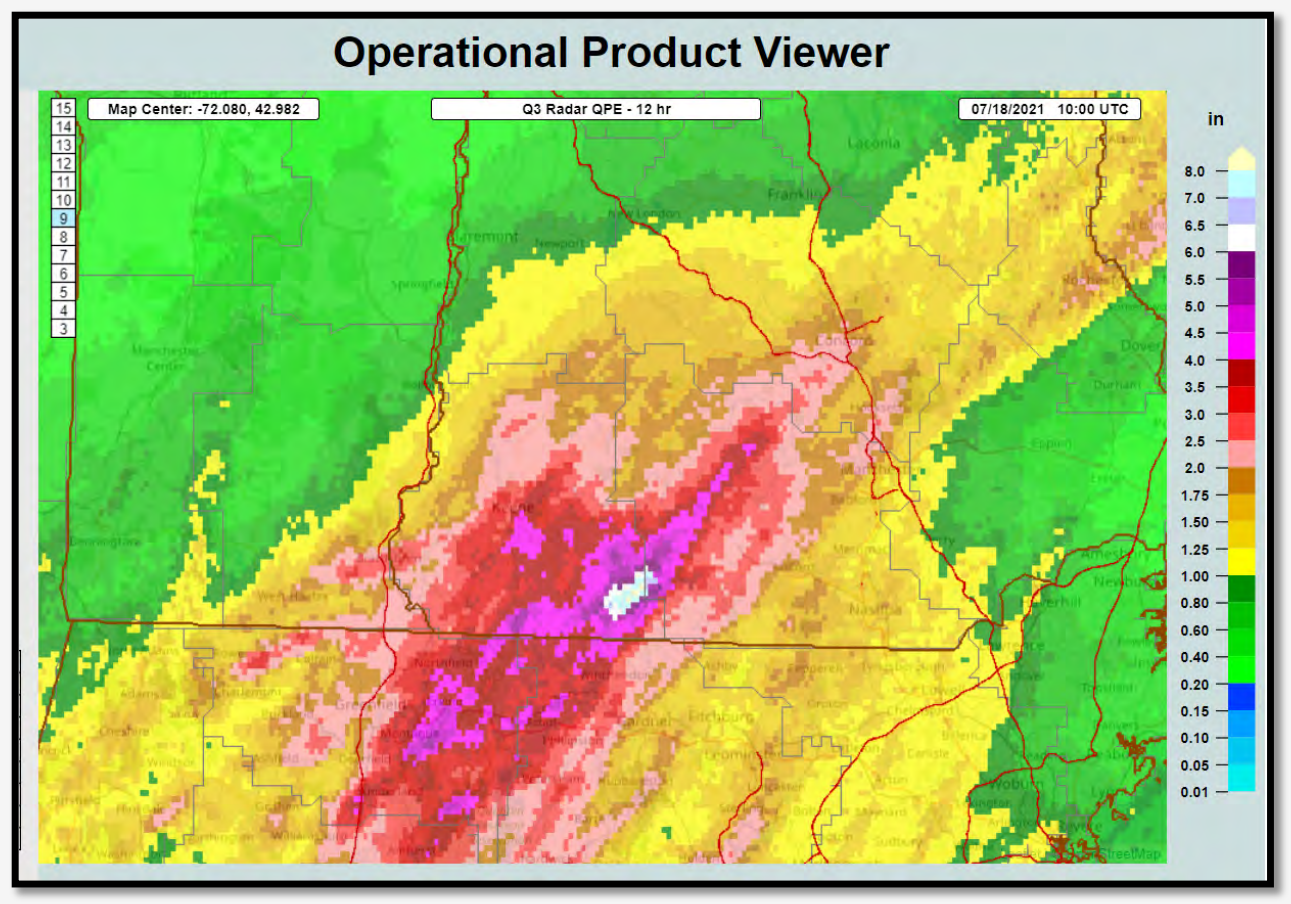


Figure 1: MRMS radar estimated 12-hr total rainfall on the night of July, 17th 2021

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.310** (0.240-0.401)	**0.370** (0.285-0.478)	**0.467** (0.359-0.607)	**0.548** (0.419-0.715)	**0.659** (0.489-0.895)	**0.743** (0.541-1.03)	**0.831** (0.587-1.19)	**0.928** (0.623-1.36)	**1.07** (0.690-1.61)	**1.18** (0.745-1.81)
10-min	**0.439** (0.339-0.568)	**0.524** (0.404-0.677)	**0.662** (0.509-0.859)	**0.777** (0.594-1.01)	**0.934** (0.693-1.27)	**1.05** (0.765-1.46)	**1.18** (0.832-1.68)	**1.32** (0.883-1.92)	**1.51** (0.977-2.28)	**1.67** (1.06-2.56)
15-min	**0.517** (0.399-0.668)	**0.616** (0.476-0.797)	**0.778** (0.599-1.01)	**0.913** (0.699-1.19)	**1.10** (0.815-1.49)	**1.24** (0.901-1.71)	**1.39** (0.979-1.98)	**1.55** (1.04-2.26)	**1.78** (1.15-2.68)	**1.96** (1.24-3.02)
30-min	**0.721** (0.557-0.933)	**0.861** (0.664-1.11)	**1.09** (0.838-1.41)	**1.28** (0.978-1.67)	**1.54** (1.14-2.09)	**1.73** (1.26-2.40)	**1.94** (1.37-2.77)	**2.17** (1.46-3.17)	**2.49** (1.61-3.75)	**2.75** (1.74-4.23)
60-min	**0.926** (0.716-1.20)	**1.11** (0.853-1.43)	**1.40** (1.08-1.82)	**1.64** (1.26-2.14)	**1.98** (1.47-2.68)	**2.23** (1.62-3.09)	**2.49** (1.76-3.57)	**2.79** (1.87-4.07)	**3.20** (2.07-4.83)	**3.54** (2.24-5.44)
2-hr	**1.16** (0.904-1.50)	**1.40** (1.09-1.80)	**1.78** (1.38-2.30)	**2.10** (1.62-2.73)	**2.54** (1.90-3.44)	**2.87** (2.11-3.96)	**3.22** (2.30-4.61)	**3.63** (2.44-5.27)	**4.22** (2.74-6.33)	**4.72** (3.00-7.20)
3-hr	**1.32** (1.03-1.69)	**1.60** (1.24-2.05)	**2.05** (1.59-2.63)	**2.42** (1.87-3.12)	**2.93** (2.19-3.95)	**3.31** (2.44-4.56)	**3.72** (2.67-5.31)	**4.20** (2.84-6.08)	**4.92** (3.20-7.35)	**5.53** (3.52-8.41)
6-hr	**1.64** (1.29-2.09)	**1.99** (1.56-2.54)	**2.56** (2.00-3.27)	**3.04** (2.36-3.90)	**3.69** (2.78-4.95)	**4.17** (3.09-5.72)	**4.69** (3.39-6.70)	**5.33** (3.61-7.66)	**6.30** (4.11-9.36)	**7.14** (4.56-10.8)
12-hr	**2.03** (1.60-2.57)	**2.46** (1.94-3.12)	**3.18** (2.49-4.03)	**3.76** (2.94-4.80)	**4.58** (3.47-6.11)	**5.17** (3.86-7.07)	**5.83** (4.25-8.29)	**6.64** (4.51-9.49)	**7.90** (5.17-11.6)	**8.99** (5.75-13.5)
24-hr	**2.44** (1.94-3.07)	**2.97** (2.35-3.73)	**3.83** (3.02-4.83)	**4.54** (3.57-5.75)	**5.52** (4.21-7.33)	**6.24** (4.68-8.47)	**7.03** (5.15-9.94)	**8.01** (5.47-11.4)	**9.52** (6.25-13.9)	**10.8** (6.95-16.1)
2-day	**2.87** (2.29-3.58)	**3.48** (2.78-4.35)	**4.49** (3.57-5.63)	**5.33** (4.21-6.71)	**6.48** (4.96-8.53)	**7.33** (5.51-9.86)	**8.25** (6.05-11.5)	**9.37** (6.42-13.2)	**11.1** (7.29-16.1)	**12.5** (8.06-18.5)

Figure 2: Point Precipitation Frequency Estimates for the Monadnock Region

Flood Warnings

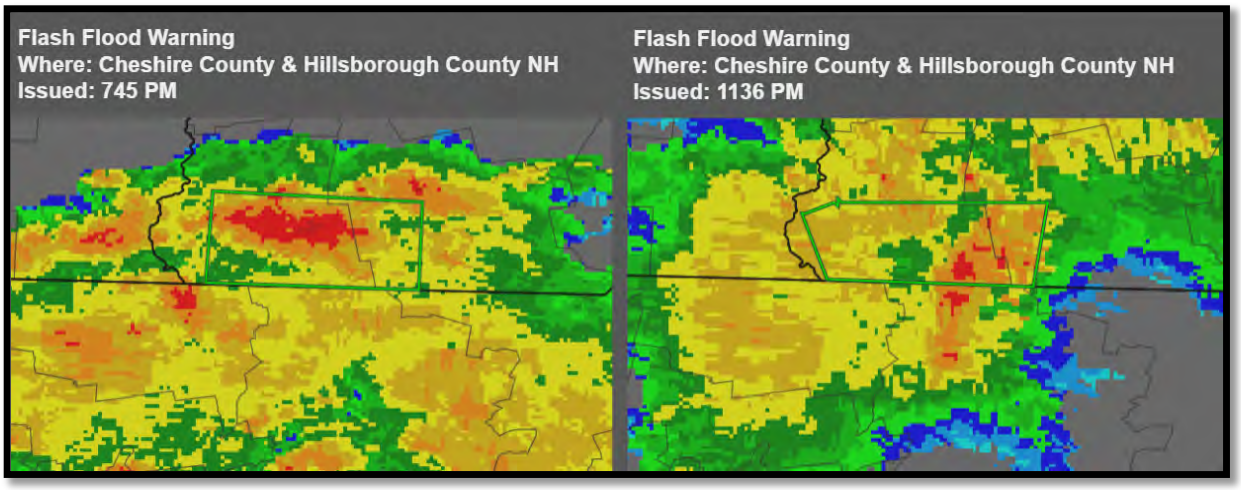


Figure 3: NWS Gray Flash Flood Warnings on July 17th and 18th 2021 for New Hampshire Counties

The first flash flood warning was issued at 7:45 PM and was valid through 10:45 PM. The first reports of flash flooding occurring around an hour after the issuance. After a small lull in the precipitation, a second round of rain began which prompted a second flash flood warning at 11:36 PM which was issued for 4 hours. More significant flooding occurred with this second warning. As the rain continued through the night the flood threat began to shift from localized flash flooding into small stream and river flooding. The warnings shifted to areal flood warnings to cover the delayed river response flooding as the run-off began to navigate into the river system. By the morning of the 18th the flood threat shifted solely to tributary and main-stem river flooding with the Ashuelot and Upper Contoocook Rivers being the most impacted basins.

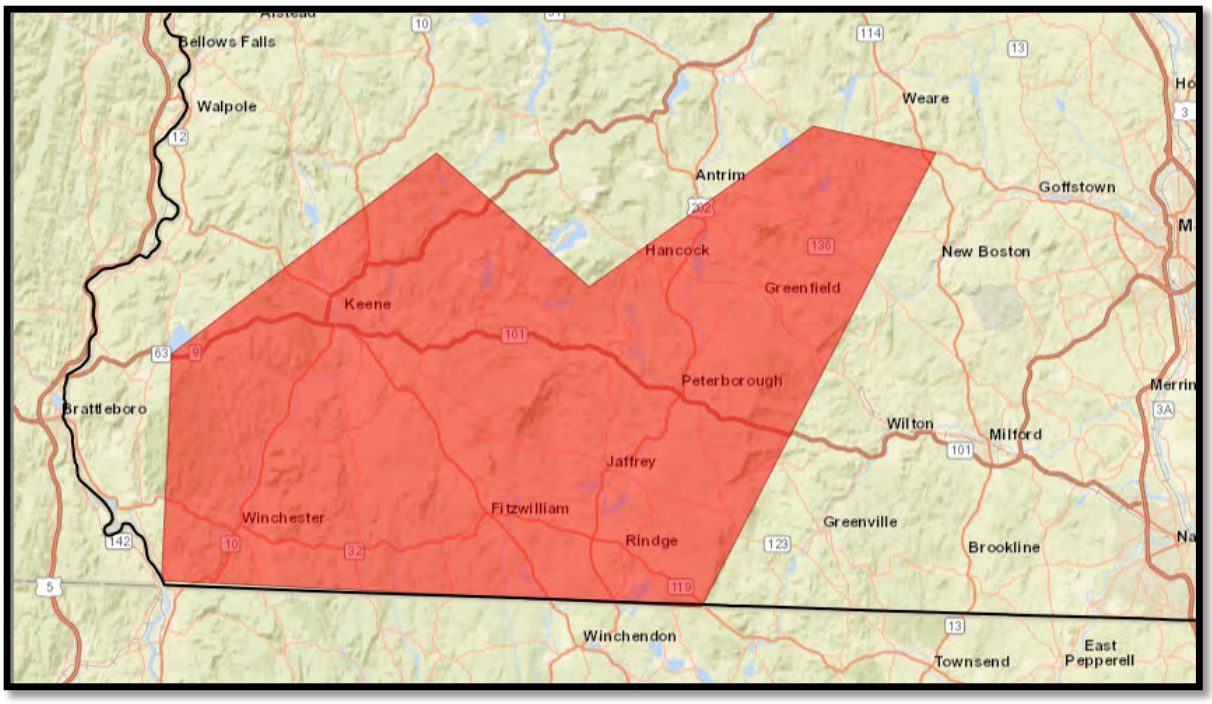


Figure 4: NWS Gray Areal Flood Warnings on the morning of July 18th 2021 for New Hampshire Counties

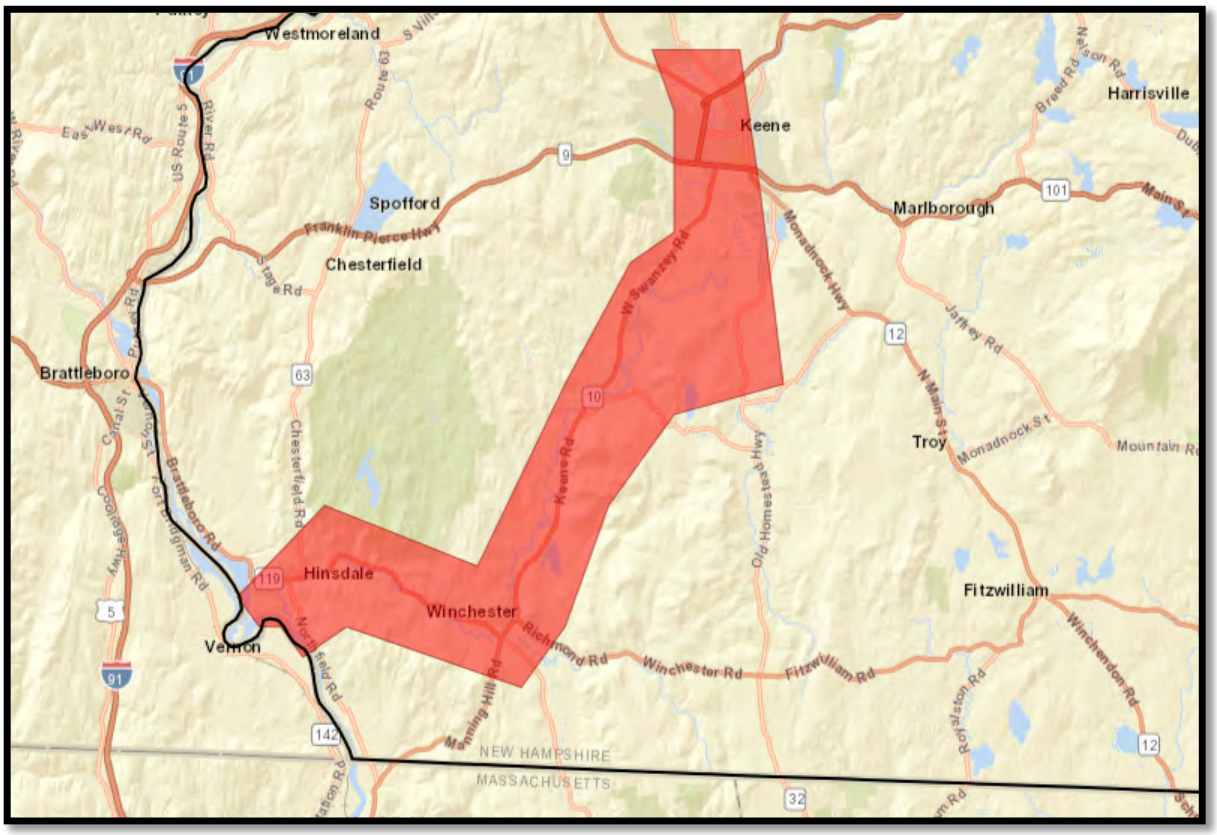
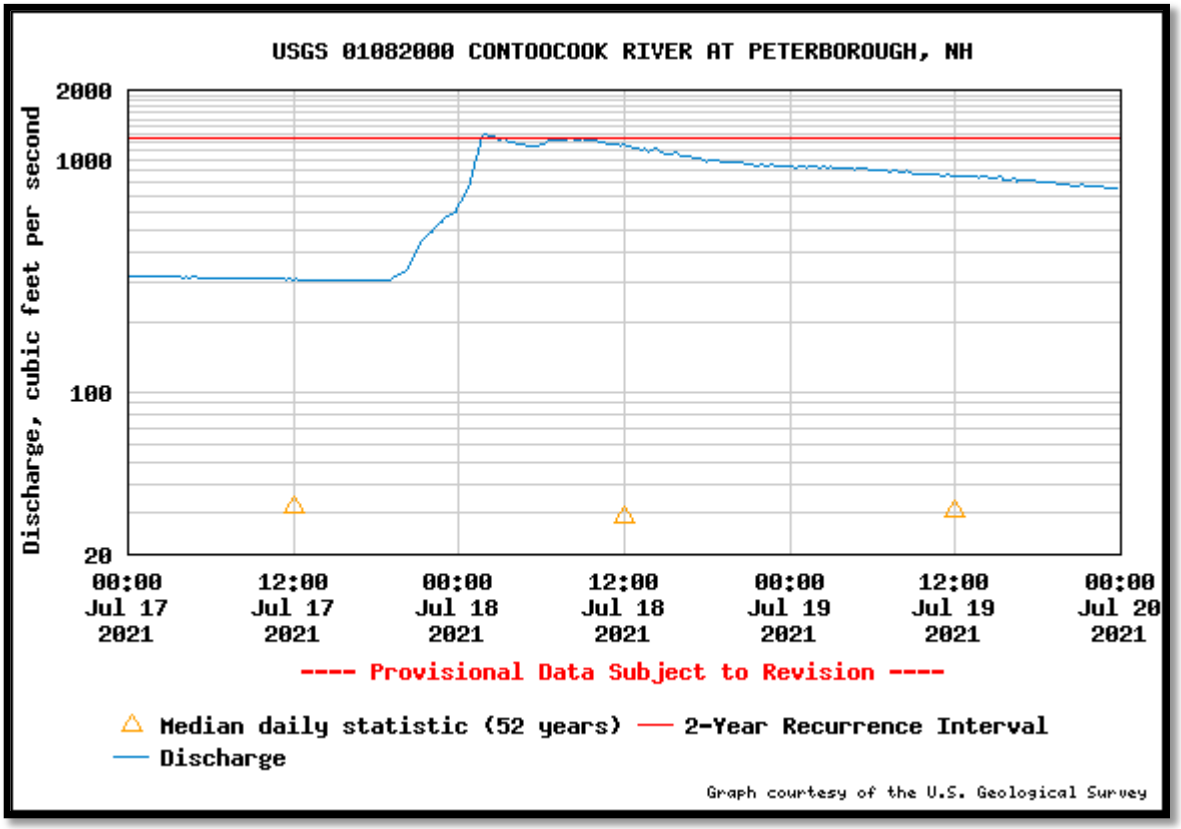


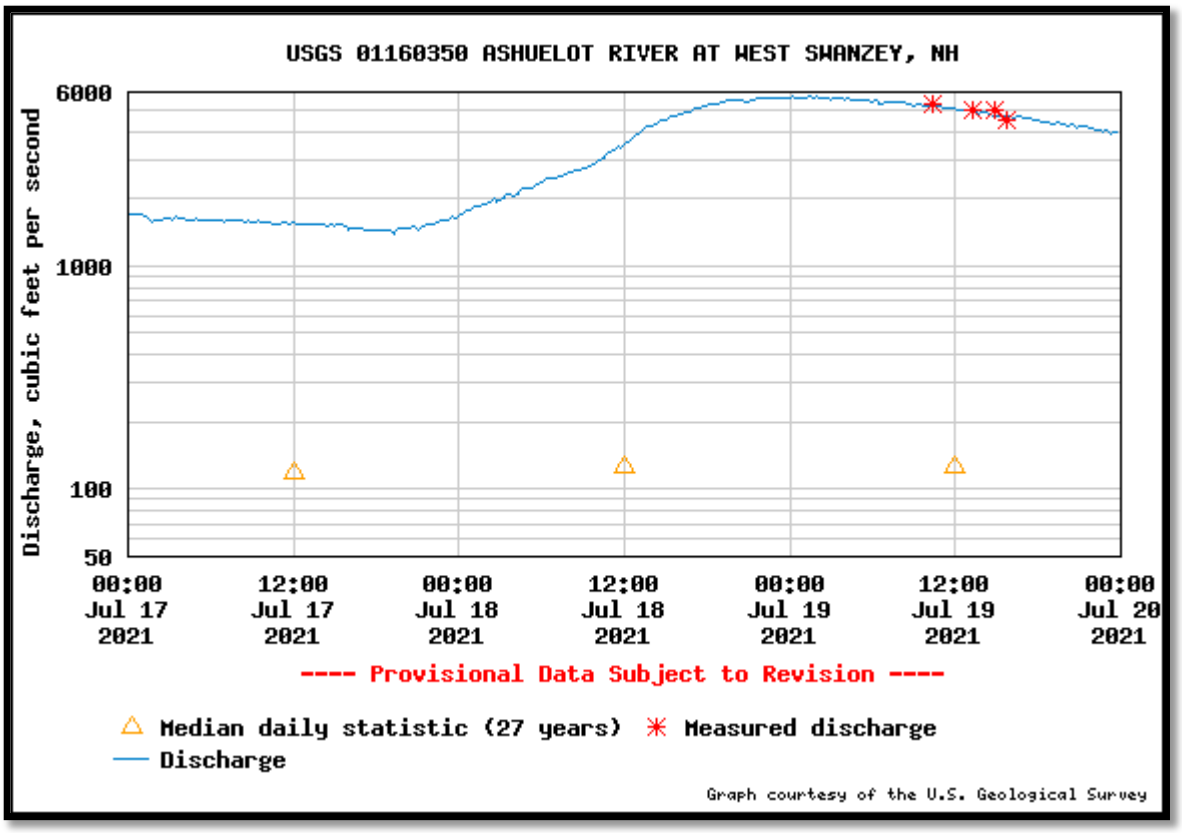
Figure 5: NWS Gray Areal Flood Warnings on the evening of July 18th 2021 for the Ashuelot River

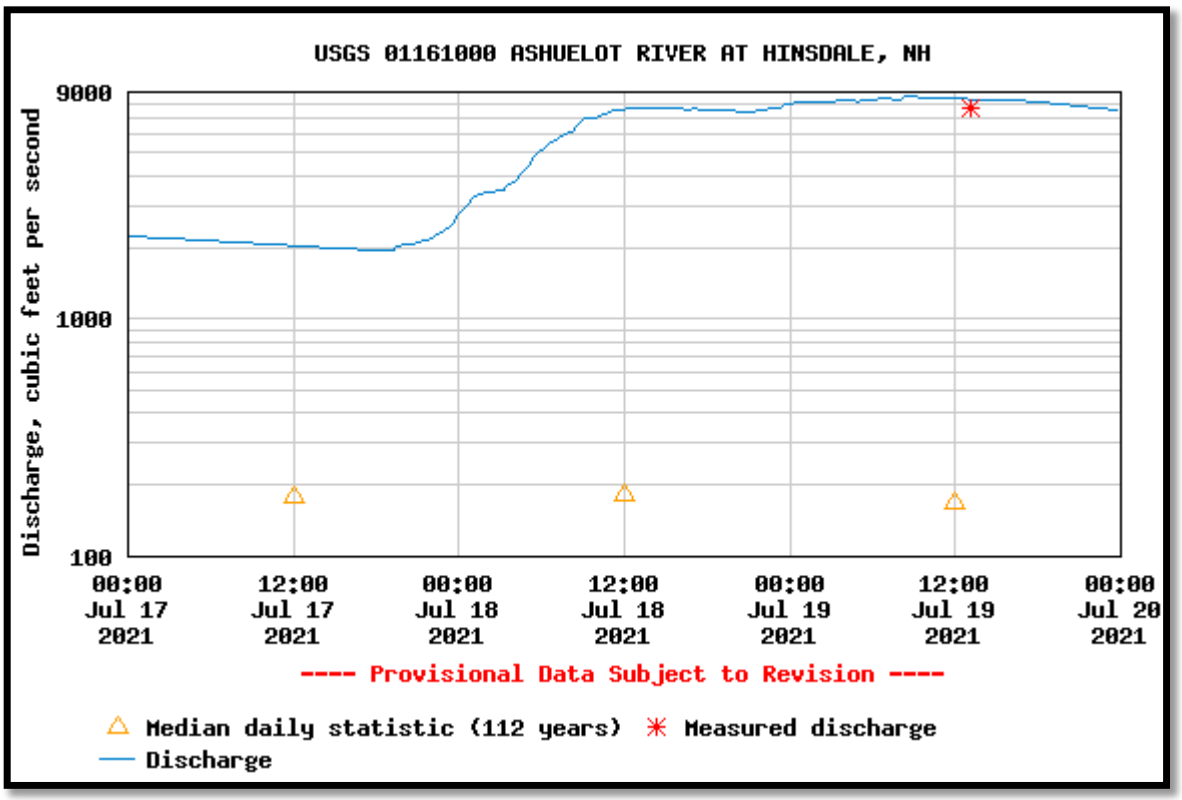
River Flooding

No official river forecast points reached flood stage during the event with the Contoocook River reaching action stage just shy of minor flooding. However, a few local river gages did report high flows and some minor flood impacts were observed. There is no official flood warning point on the Ashuelot River, but the NWS did issue a flood warning for the Ashuelot River for Sunday through Monday (7/18-7/19) to account for observed flooding. Some minor flooding was also reported from the Contoocook River over North Bennington Road in Bennington on Sunday night.

Figures 5-8: USGS River Gage Discharge in Cheshire and Hillsborough Counties on July 17-19 2021




USGS 01160350 ASHUELOT RIVER AT WEST SWANZEY, NH
Discharge, cubic feet per second
6000
1000
100
50
00:00 Jul 17 2021
12:00 Jul 17 2021
00:00 Jul 18 2021
12:00 Jul 18 2021
00:00 Jul 19 2021
12:00 Jul 19 2021
00:00 Jul 20 2021
---- Provisional Data Subject to Revision ----
Median daily statistic (27 years)
Measured discharge
Discharge
Graph courtesy of the U.S. Geological Survey


USGS 01161000 ASHUELOT RIVER AT HINSDALE, NH
Discharge, cubic feet per second
9000
1000
100
00:00 Jul 17 2021
12:00 Jul 17 2021
00:00 Jul 18 2021
12:00 Jul 18 2021
00:00 Jul 19 2021
12:00 Jul 19 2021
00:00 Jul 20 2021
---- Provisional Data Subject to Revision ----
Median daily statistic (112 years)
Measured discharge
Discharge

Based on preliminary data from the USGS, the Ashuelot River reached its highest flow/stage since the October 9th, 2005 flood event.

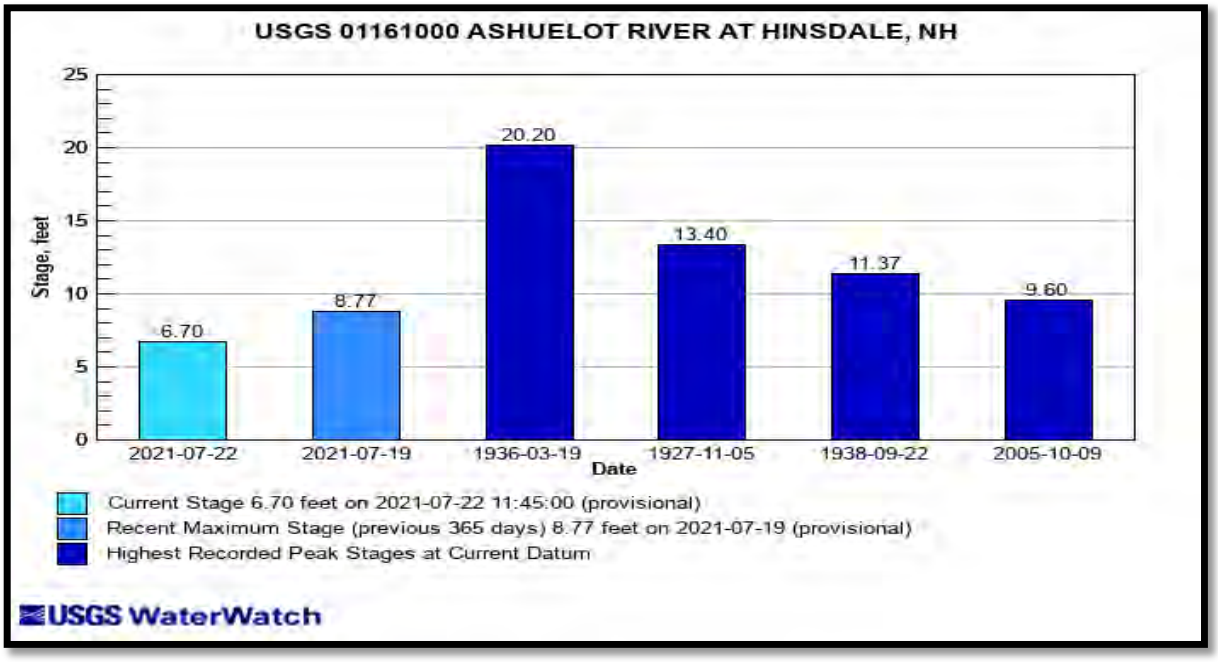
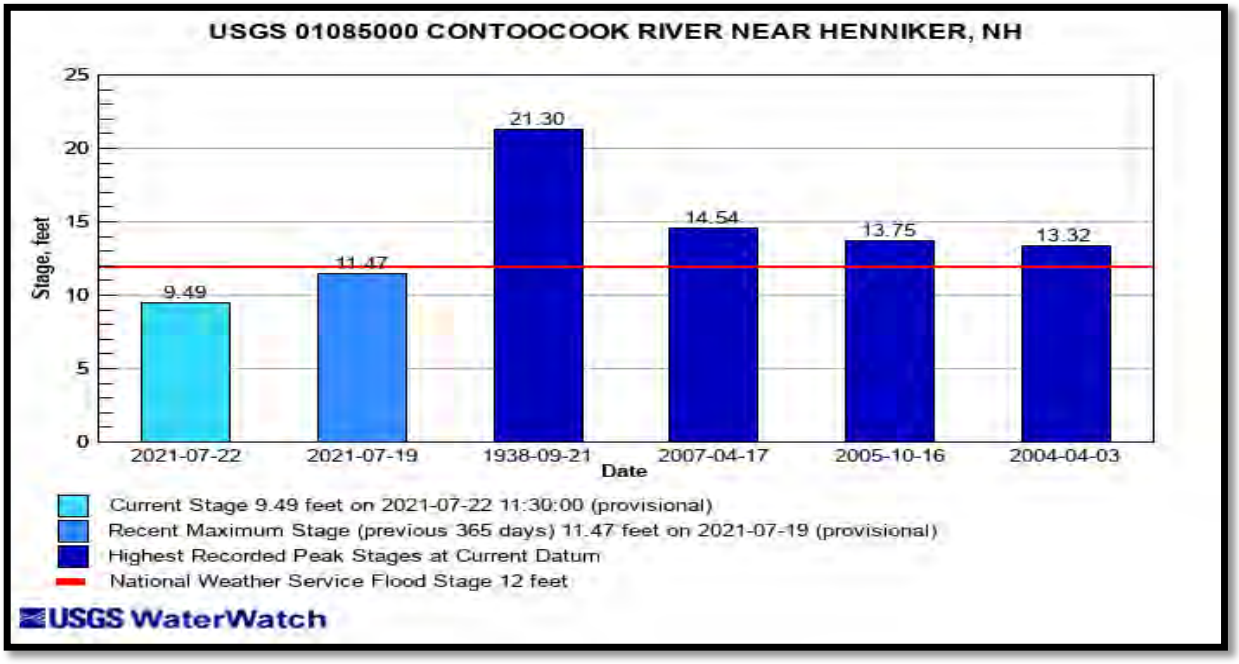


Figure 9: USGS Hinsdale, NH Gage Peak Flow Chart

The Contoocook River in Henniker peaked just below flood stage and was the highest flow since 2010.



Figures 10: USGS Henniker, NH Gage Peak Flow Chart

ENCLOSURE B TO MAJOR DISASTER DECLARATION REQUEST
Supplemental Information for Public Assistance

Estimated Stafford Act Requirements for Public Assistance

County $3.89

Date: 9/10/2021	PUBLIC DAMAGE								GOAL			
Report #:	A	B	C	D	E	F	G	TOTAL	POP. '10 Est.	$/CAP.	$3.89/CAP.	SHORT
Belknap County	$0	$0	$0	$0	$0	$0	$0	$0	60,088	0.00	233,742	(233,743)
Carroll County	$0	$0	$0	$0	$0	$0	$0	$0	47,818	0.00	186,012	(186,013)
Cheshire County	$0	$33,399	$1,984,143	$0	$12,086	$35,125	$0	$2,064,752	77,117	26.77	299,985	0
Coos County	$0	$0	$0	$0	$0	$0	$0	$0	33,055	0.00	128,584	(128,584)
Grafton County	$0	$0	$0	$0	$0	$0	$0	$0	89,118	0.00	346,669	(346,670)
Hillsborough County	$0	$0	$0	$0	$0	$0	$0	$0	400,721	0.00	1,558,805	(1,558,805)
Merrimack County	$0	$0	$0	$0	$0	$0	$0	$0	146,445	0.00	569,671	(569,672)
Rockingham County	$0	$0	$0	$0	$0	$0	$0	$0	295,223	0.00	1,148,417	(1,148,418)
Strafford County	$0	$0	$0	$0	$0	$0	$0	$0	123,143	0.00	479,026	(479,027)
Sullivan County	$0	$0	$0	$0	$0	$0	$0	$0	43,742	0.00	170,156	(170,157)
State Agencies	$0	$0	$0	$0	$0	$0	$0	$0	**State POP**	**$/CAP.**	**$1.55/CAP**	**SHORT**
Totals	**$0**	**$33,399**	**$1,984,143**	**$0**	**$12,086**	**$35,125**	**$0**	**$2,064,752**	1,316,470	**1.57**	$2,040,529	$0

NOTES:	DEBRIS CLEARANCE	PROTECTIVE MEASURES	ROAD SYSTEM	WATER CONTROL	BUILDINGS & EQUIPMENT	PUBLIC UTILITY	PARKS & OTHER
Percentages	0.00%	1.62%	96.10%	0.00%	0.59%	1.70%	0.00%

1,316,470	State Population Check Sum